



#7

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SEQUENCE LISTING

<110> Boehringer Ingelheim International GmbH
<120> Method for identifying compounds that modulate sister chromatid separation
<130> 0652.2290001
<140> To be assigned
<141> Herewith
<150> EP 01 101 252.3
<151> 2001-01-19
<150> US 60/297,440
<151> 2001-06-13
<160> 12
<170> PatentIn Ver. 2.1
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<211> 6668
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Met Arg Ser Phe Lys Arg Val Asn Phe
1 5
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Gly Thr Leu Leu Ser Ser Gln Lys Glu Ala Glu Glu Leu Leu Pro Asp
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Leu Lys Glu Phe Leu Ser Asn Pro Pro Ala Gly Phe Pro Ser Ser Arg
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tct gat gct gag agg aga caa gct tgt gat gcc atc ctg agg gct tgc 315
Ser Asp Ala Glu Arg Arg Gln Ala Cys Asp Ala Ile Leu Arg Ala Cys
45 50 55
aac cag cag ctg act gct aag cta gct tgc cct agg cat ctg ggg agc 363
Asn Gln Gln Leu Thr Ala Lys Leu Ala Cys Pro Arg His Leu Gly Ser
60 65 70

ctg	ctg	gag	ctg	gca	gag	ctg	gcc	tgt	gat	ggc	tac	tta	gtg	tct	acc	411
Leu	Leu	Glu	Leu	Ala	Glu	Leu	Ala	Cys	Asp	Gly	Tyr	Leu	Val	Ser	Thr	
75				80						85						
cca	cag	cgt	cct	ccc	ctc	tac	ctg	gaa	cga	att	ctc	ttt	gtc	tta	ctg	459
Pro	Gln	Arg	Pro	Pro	Leu	Tyr	Leu	Glu	Arg	Ile	Leu	Phe	Val	Leu	Leu	
90				95						100				105		
cgg	aat	gct	gct	gca	caa	gga	agc	cca	gag	gtc	aca	ctc	cgc	ctt	gct	507
Arg	Asn	Ala	Ala	Gln	Gly	Ser	Pro	Glu	Val	Thr	Leu	Arg	Leu	Ala		
										115			120			
cag	ccc	ctc	cat	gcc	tgc	ttg	gtg	cag	tgc	tct	cgc	gag	gct	gct	ccc	555
Gln	Pro	Leu	His	Ala	Cys	Leu	Val	Gln	Cys	Ser	Arg	Glu	Ala	Ala	Pro	
										130			135			
cag	gac	tat	gag	gcc	gtg	gct	cgg	ggc	agc	ttt	tct	ctg	ctt	tgg	aag	603
Gln	Asp	Tyr	Glu	Ala	Val	Ala	Arg	Gly	Ser	Phe	Ser	Leu	Leu	Trp	Lys	
										145			150			
ggg	gca	gaa	gcc	ctg	ttg	gaa	cgg	cga	gct	gca	ttt	gca	gct	cgg	ctg	651
Gly	Ala	Glu	Ala	Leu	Leu	Glu	Arg	Arg	Ala	Ala	Phe	Ala	Ala	Arg	Leu	
										155			160			
aag	gcc	ttg	agc	ttc	cta	gta	ctc	ttg	gag	gat	gaa	agt	acc	cct	tgt	699
Lys	Ala	Leu	Ser	Phe	Leu	Val	Leu	Glu	Asp	Glu	Ser	Thr	Pro	Cys		
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gag	gtt	cct	cac	ttt	gct	tct	cca	aca	gcc	tgt	cga	gct	gtc	gct	gcc	747
Glu	Val	Pro	His	Phe	Ala	Ser	Pro	Thr	Ala	Cys	Arg	Ala	Val	Ala	Ala	
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cat	cag	cta	ttt	gat	gcc	agt	ggc	cat	ggt	cta	aat	gaa	gca	gat	gct	795
His	Gln	Leu	Phe	Asp	Ala	Ser	Gly	His	Gly	Leu	Asn	Glu	Ala	Asp	Ala	
										205			210		215	
gat	ttc	cta	gat	gac	ctg	ctc	tcc	agg	cac	gtg	atc	aga	gcc	ttg	gtg	843
Asp	Phe	Leu	Asp	Asp	Leu	Leu	Ser	Arg	His	Val	Ile	Arg	Ala	Leu	Val	
										220			225		230	
ggt	gag	aga	ggg	agc	tct	tct	ggg	ctt	ctt	tct	ccc	cag	agg	gcc	ctc	891
Gly	Glu	Arg	Gly	Ser	Ser	Ser	Gly	Leu	Leu	Ser	Pro	Gln	Arg	Ala	Leu	
										235			240		245	
tgc	ctc	ttg	gag	ctc	acc	ttg	gaa	cac	tgc	cgt	cgc	ttt	ttc	tgg	agc	939
Cys	Leu	Leu	Glu	Leu	Thr	Leu	Glu	His	Cys	Arg	Arg	Phe	Cys	Trp	Ser	
										250			255		260	
cgc	cac	cat	gac	aaa	gcc	atc	agc	gca	gtg	gag	aag	gct	cac	agt	tac	987
Arg	His	His	Asp	Lys	Ala	Ile	Ser	Ala	Val	Glu	Lys	Ala	His	Ser	Tyr	
										270			275		280	
cta	agg	aac	acc	aat	cta	gcc	cct	agc	ctt	cag	cta	tgt	cag	ctg	ggg	1035
Leu	Arg	Asn	Thr	Asn	Leu	Ala	Pro	Ser	Leu	Gln	Leu	Cys	Gln	Leu	Gly	
										285			290		295	
gtt	aag	ctg	ctg	cag	gtt	ggg	gag	gaa	gga	cct	cag	gca	gtg	gcc	aag	1083
Val	Lys	Leu	Leu	Gln	Val	Gly	Glu	Glu	Gly	Gly	Pro	Gln	Ala	Val	Ala	
										300			305		310	
ctt	ctg	atc	aag	gca	tca	gct	gtc	ctg	agc	aag	agt	atg	gag	gca	cca	1131

Leu Ile Lys Ala Ser Ala Val Leu Ser Lys Ser Met Glu Ala Pro	315	320	325	
tca ccc cca ctt cgg gca ttg tat gag agc tgc cag ttc ttc ctt tca	330	335	340	1179
Ser Pro Pro Leu Arg Ala Leu Tyr Glu Ser Cys Gln Phe Phe Leu Ser				
330	335	340	345	
ggc ctg gaa cga ggc acc aag agg cgc tat aga ctt gat gcc att ctg	350	355	360	1227
Gly Leu Glu Arg Gly Thr Lys Arg Arg Tyr Arg Leu Asp Ala Ile Leu				
350	355	360		
agc ctc ttt gct ttt ctt gga ggg tac tgc tct ctt ctg cag cag ctg	365	370	375	1275
Ser Leu Phe Ala Phe Leu Gly Gly Tyr Cys Ser Leu Leu Gln Gln Leu				
365	370	375		
cgg gat gat ggt gtg tat ggg ggc tcc tcc aag caa cag cag tct ttt	380	385	390	1323
Arg Asp Asp Gly Val Tyr Gly Ser Ser Lys Gln Gln Ser Phe				
380	385	390		
ctt cag atg tac ttt cag gga ctt cac ctc tac act gtg gtg gtt tat	395	400	405	1371
Leu Gln Met Tyr Phe Gln Gly Leu His Leu Tyr Thr Val Val Val Tyr				
395	400	405		
gac ttt gcc caa ggc tgt cag ata gtt gat ttg gct gac ctg acc caa	410	415	420	1419
Asp Phe Ala Gln Gly Cys Gln Ile Val Asp Leu Ala Asp Leu Thr Gln				
410	415	420	425	
ctt gtg gac agt tgt aaa tct acc gtt gtc tgg atg ctg gag gcc tta	430	435	440	1467
Leu Val Asp Ser Cys Lys Ser Thr Val Val Trp Met Leu Glu Ala Leu				
430	435	440		
gag ggc ctg tcg ggc caa gag ctg acg gac cac atg ggg atg acc gct	445	450	455	1515
Glu Gly Leu Ser Gly Gln Glu Leu Thr Asp His Met Gly Met Thr Ala				
445	450	455		
tct tac acc agt aat ttg gcc tac agc ttc tat agt cac aag ctc tat	460	465	470	1563
Ser Tyr Thr Ser Asn Leu Ala Tyr Ser Phe Tyr Ser His Lys Leu Tyr				
460	465	470		
gcc gag gcc tgt gcc atc tct gag ccg ctc tgt cag cac ctg ggt ttg	475	480	485	1611
Ala Glu Ala Cys Ala Ile Ser Glu Pro Leu Cys Gln His Leu Gly Leu				
475	480	485		
gtg aag cca ggc act tat ccc gag gtg cct cct gag aag ttg cac agg	490	495	500	1659
Val Lys Pro Gly Thr Tyr Pro Glu Val Pro Pro Glu Lys Leu His Arg				
490	495	500	505	
tgc ttc cgg cta caa gta gag agt ttg aag aaa ctg ggt aaa cag gcc	510	515	520	1707
Cys Phe Arg Leu Gln Val Glu Ser Leu Lys Lys Leu Gly Lys Gln Ala				
510	515	520		
cag ggc tgc aag atg gtg att ttg tgg ctg gca gcc ctg caa ccc tgt	525	530	535	1755
Gln Gly Cys Lys Met Val Ile Leu Trp Leu Ala Ala Leu Gln Pro Cys				
525	530	535		
agc cct gaa cac atg gct gag cca gtc act ttc tgg gtt cgg gtc aag	540	545	550	1803
Ser Pro Glu His Met Ala Glu Pro Val Thr Phe Trp Val Arg Val Lys				
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atg gat gcg gcc agg gct gga gac aag gag cta cag cta aag act ctg	555	560	565	1851
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555	560	565		

cga gac agc ctc agt ggc tgg gac ccg gag acc ctg gcc ctc ctg ctg	1899
Arg Asp Ser Leu Ser Gly Trp Asp Pro Glu Thr Leu Ala Leu Leu Leu	
570 575 580 585	
agg gag gag ctg cag gcc tac aag gcg gtg cggt gcc gac act gga cag	1947
Arg Glu Glu Leu Gln Ala Tyr Lys Ala Val Arg Ala Asp Thr Gly Gln	
590 595 600	
gaa cgc ttc aac atc atc tgt gac ctc ctg gag ctg agc ccc gag gag	1995
Glu Arg Phe Asn Ile Ile Cys Asp Leu Leu Glu Leu Ser Pro Glu Glu	
605 610 615	
aca cca gcc ggg gcc tgg gca cga gcc acc cac ctg gta gaa ctg gct	2043
Thr Pro Ala Gly Ala Trp Ala Arg Ala Thr His Leu Val Glu Leu Ala	
620 625 630	
cag gtg ctc tgc tac cac gac ttt acg cag cag acc aac tgc tct gct	2091
Gln Val Leu Cys Tyr His Asp Phe Thr Gln Gln Thr Asn Cys Ser Ala	
635 640 645	
ctg gat gct atc cgg gaa gcc ctg cag ctt ctg gac tct gtg agg cct	2139
Leu Asp Ala Ile Arg Glu Ala Leu Gln Leu Leu Asp Ser Val Arg Pro	
650 655 660 665	
gag gcc cag gcc aga gat cag ctt ctg gac gat aaa gca cag gcc ttg	2187
Glu Ala Gln Ala Arg Asp Gln Leu Leu Asp Asp Lys Ala Gln Ala Leu	
670 675 680	
ctg tgg ctt tac atc tgt act ctg gaa gcc aaa ata cag gaa ggt atc	2235
Leu Trp Leu Tyr Ile Cys Thr Leu Glu Ala Lys Ile Gln Glu Gly Ile	
685 690 695	
gag cgg gat cgg aga gcc cag gcc cct ggt aac ttg gag gaa ttt gaa	2283
Glu Arg Asp Arg Ala Gln Ala Pro Gly Asn Leu Glu Glu Phe Glu	
700 705 710	
gtc aat gac ctg aac tat gaa gat aaa ctc cag gaa gat cgt ttc cta	2331
Val Asn Asp Leu Asn Tyr Glu Asp Lys Leu Gln Glu Asp Arg Phe Leu	
715 720 725	
tac agt aac att gcc ttc aac ctg gct gca gat gct gct cag tcc aaa	2379
Tyr Ser Asn Ile Ala Phe Asn Leu Ala Ala Asp Ala Ala Gln Ser Lys	
730 735 740 745	
tgc ctg gac caa gcc ctg gcc ctg tgg aag gag ctg ctt aca aag ggg	2427
Cys Leu Asp Gln Ala Leu Ala Leu Trp Lys Glu Leu Leu Thr Lys Gly	
750 755 760	
cag gcc cca gct gta cgg tgt ctc cag cag aca gca gcc tca ctg cag	2475
Gln Ala Pro Ala Val Arg Cys Leu Gln Gln Thr Ala Ala Ser Leu Gln	
765 770 775	
atc cta gca gcc ctc tac cag ctg gtg gca aag ccc atg cag gct ctg	2523
Ile Leu Ala Ala Leu Tyr Gln Leu Val Ala Lys Pro Met Gln Ala Leu	
780 785 790	
gag gtc ctc ctg cta cgg att gtc tct gag aga ctg aag gac cac	2571
Glu Val Leu Leu Leu Leu Arg Ile Val Ser Glu Arg Leu Lys Asp His	
795 800 805	
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Ser Lys Ala Ala Gly Ser Ser Cys His Ile Thr Gln Leu Leu Leu Thr	810	815	820	825	
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Leu Gly Cys Pro Ser Tyr Ala Gln Leu His Leu Glu Glu Ala Ala Ser					
830	835	840			
agc ctg aag cat ctc gat cag act act gac aca tac ctg ctc ctt tcc					2715
Ser Leu Lys His Leu Asp Gln Thr Thr Asp Thr Tyr Leu Leu Leu Ser					
845	850	855			
ctg acc tgt gat ctg ctt cga agt caa ctc tac tgg act cac cag aag					2763
Leu Thr Cys Asp Leu Leu Arg Ser Gln Leu Tyr Trp Thr His Gln Lys					
860	865	870			
gtg acc aag ggt gtc tct ctg ctg tct gtg ctt cgg gat cct gcc					2811
Val Thr Lys Gly Val Ser Leu Leu Leu Ser Val Leu Arg Asp Pro Ala					
875	880	885			
ctc cag aag tcc tcc aag gct tgg tac ttg ctg cgt gtc cag gtc ctg					2859
Leu Gln Lys Ser Ser Lys Ala Trp Tyr Leu Leu Arg Val Gln Val Leu					
890	895	900	905		
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Gln Leu Val Ala Ala Tyr Leu Ser Leu Pro Ser Asn Asn Leu Ser His					
910	915	920			
tcc ctg tgg gag cag ctc tgt gcc caa ggc tgg cag aca cct gag ata					2955
Ser Leu Trp Glu Gln Leu Cys Ala Gln Gly Trp Gln Thr Pro Glu Ile					
925	930	935			
gct ctc ata gac tcc cat aag ctc ctc cga agc atc atc ctc ctg ctg					3003
Ala Leu Ile Asp Ser His Lys Leu Leu Arg Ser Ile Ile Leu Leu Leu					
940	945	950			
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Met Gly Ser Asp Ile Leu Ser Thr Gln Lys Ala Ala Val Glu Thr Ser					
955	960	965			
ttt ttg gac tat ggt gaa aat ctg gta caa aaa tgg cag gtt ctt tca					3099
Phe Leu Asp Tyr Gly Glu Asn Leu Val Gln Lys Trp Gln Val Leu Ser					
970	975	980	985		
gag gtg ctg agc tgc tca gag aag ctg gtc tgc cac ctg ggc cgc ctg					3147
Glu Val Leu Ser Cys Ser Glu Lys Leu Val Cys His Leu Gly Arg Leu					
990	995	1000			
ggt agt gtg agt gaa gcc aag gcc ttt tgc ttg gag gcc cta aaa ctt					3195
Gly Ser Val Ser Glu Ala Lys Ala Phe Cys Leu Glu Ala Leu Lys Leu					
1005	1010	1015			
aca aca aag ctg cag ata cca cgc cag tgt gcc ctg ttc ctg gtg ctg					3243
Thr Thr Lys Leu Gln Ile Pro Arg Gln Cys Ala Leu Phe Leu Val Leu					
1020	1025	1030			
aag ggc gag ctg gag ctg gcc cgc aat gac att gat ctc tgt cag tcg					3291
Lys Gly Glu Leu Glu Leu Ala Arg Asn Asp Ile Asp Leu Cys Gln Ser					
1035	1040	1045			
gac ctg cag cag gtt ctg ttc ttg gag tct tgc aca gag ttt ggt					3339
Asp Leu Gln Gln Val Leu Phe Leu Leu Glu Ser Cys Thr Glu Phe Gly					
1050	1055	1060	1065		

ggg gtg act cag cac ctg gac tct gtg aag aag gtc cac ctg cag aag		3387	
Gly Val Thr Gln His Leu Asp Ser Val Lys Lys Val His Leu Gln Lys			
1070	1075	1080	
ggg aag cag cag gcc cag gtc ccc tgt cct cca cag ctc cca gag gag		3435	
Gly Lys Gln Gln Ala Gln Val Pro Cys Pro Pro Gln Leu Pro Glu Glu			
1085	1090	1095	
gag ctc ttc cta aga ggc cct gct cta gag ctg gtg gcc act gtg gcc		3483	
Glu Leu Phe Leu Arg Gly Pro Ala Leu Glu Leu Val Ala Thr Val Ala			
1100	1105	1110	
aag gag cct ggc ccc ata gca cct tct aca aac tcc tcc cca gtc ttg		3531	
Lys Glu Pro Gly Pro Ile Ala Pro Ser Thr Asn Ser Ser Pro Val Leu			
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aaa acc aag ccc cag ccc ata ccc aac ttc ctg tcc cat tca ccc acc		3579	
Lys Thr Lys Pro Gln Pro Ile Pro Asn Phe Leu Ser His Ser Pro Thr			
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tgt gac tgc tcg ctc tgc gcc agc cct gtc ctc aca gca gtc tgt ctg		3627	
Cys Asp Cys Ser Leu Cys Ala Ser Pro Val Leu Thr Ala Val Cys Leu			
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cgc tgg gta ttg gtc acg gca ggg gtg agg ctg gcc atg ggc cac caa		3675	
Arg Trp Val Leu Val Thr Ala Gly Val Arg Leu Ala Met Gly His Gln			
1165	1170	1175	
gcc cag ggt ctg gat ctg ctg cag gtc gtg ctg aag ggc tgt cct gaa		3723	
Ala Gln Gly Leu Asp Leu Leu Gln Val Val Leu Lys Gly Cys Pro Glu			
1180	1185	1190	
gcc gct gag cgc ctc acc caa gct ctc caa gct tcc ctg aat cat aaa		3771	
Ala Ala Glu Arg Leu Thr Gln Ala Leu Gln Ala Ser Leu Asn His Lys			
1195	1200	1205	
aca ccc ccc tcc ttg gtt cca agc ctc ttg gat gag atc ttg gct caa		3819	
Thr Pro Pro Ser Leu Val Pro Ser Leu Leu Asp Glu Ile Leu Ala Gln			
1210	1215	1220	1225
gca tac aca ctc ttg gca ctg gag ggc ctg aac cag cca tca aac gag		3867	
Ala Tyr Thr Leu Leu Ala Leu Glu Gly Leu Asn Gln Pro Ser Asn Glu			
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Ser Leu Gln Lys Val Leu Gln Ser Gly Leu Lys Phe Val Ala Ala Arg			
1245	1250	1255	
ata ccc cac cta gag ccc tgg cga gcc agc ctg ctc ttg att tgg gcc		3963	
Ile Pro His Leu Glu Pro Trp Arg Ala Ser Leu Leu Leu Ile Trp Ala			
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Leu Thr Lys Leu Gly Gly Leu Ser Cys Cys Thr Thr Gln Leu Phe Ala			
1275	1280	1285	
agc tcc tgg ggc tgg cag cca cca tta ata aaa agt gtc cct ggc tca		4059	
Ser Ser Trp Gly Trp Gln Pro Pro Leu Ile Lys Ser Val Pro Gly Ser			
1290	1295	1300	1305

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Glu Pro Ser Lys Thr Gln Gly Gln Lys Arg Ser Gly Arg Gly Arg Gln	
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Lys Leu Ala Ser Ala Pro Leu Ser Leu Asn Asn Thr Ser Gln Lys Gly	
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Arg Gln Ala Gly Pro His Val Pro Phe Thr Val Phe Glu Glu Val Cys	
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Pro Thr Glu Ser Lys Pro Glu Val Pro Gln Ala Pro Arg Val Gln Gln	
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aga gtc cag acg cgc ctc aag gtg aac ttc agt gat gac agt gac ttg	4347
Arg Val Gln Thr Arg Leu Lys Val Asn Phe Ser Asp Asp Ser Asp Leu	
1390 1395 1400	
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Glu Asp Pro Val Ser Ala Glu Ala Trp Leu Ala Glu Glu Pro Lys Arg	
1405 1410 1415	
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Arg Gly Thr Ala Ser Arg Gly Arg Gly Arg Ala Arg Lys Gly Leu Ser	
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cta aag acg gat gcc gtg gtt gcc cca ggt agt gcc cct ggg aac cct	4491
Leu Lys Thr Asp Ala Val Val Ala Pro Gly Ser Ala Pro Gly Asn Pro	
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Gly Leu Asn Gly Arg Ser Arg Arg Ala Lys Lys Val Ala Ser Arg His	
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tgt gag gag cg ^g cgt ccc cag agg gcc agt gac cag gcc agg cct ggc	4587
Cys Glu Glu Arg Arg Pro Gln Arg Ala Ser Asp Gln Ala Arg Pro Gly	
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Pro Glu Ile Met Arg Thr Ile Pro Glu Glu Leu Thr Asp Asn Trp	
1485 1490 1495	
aga aaa atg agc ttt gag atc ctc agg ggc tct gac ggg gaa gac tca	4683
Arg Lys Met Ser Phe Glu Ile Leu Arg Gly Ser Asp Gly Glu Asp Ser	
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gcc tca ggt ggg aag act cca gct ccg ggc cct gag gca gct tct gga	4731
Ala Ser Gly Gly Lys Thr Pro Ala Pro Gly Pro Glu Ala Ala Ser Gly	
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Glu Trp Glu Leu Leu Arg Leu Asp Ser Ser Lys Lys Lys Leu Pro Ser	
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cca tgc cca gac aag gag agt gac aag gac ctt ggt cct ccg ctc cag	4827
Pro Cys Pro Asp Lys Glu Ser Asp Lys Asp Leu Gly Pro Arg Leu Gln	
1550 1555 1560	

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Leu Pro Ser Ala Pro Val Ala Thr Gly Leu Ser Thr Leu Asp Ser Ile	
1565 1570 1575	
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Cys Asp Ser Leu Ser Val Ala Phe Arg Gly Ile Ser His Cys Pro Pro	
1580 1585~ 1590	
agt ggg ctc tat gcc cac ctc tgc cgc ttc ctg gcc ttg tgc ctg ggc	4971
Ser Gly Leu Tyr Ala His Leu Cys Arg Phe Leu Ala Leu Cys Leu Gly	
1595 1600 1605	
cac cgg gat cct tat gcc act gct ttc ctt gtc acc gag tct gtc tcc	5019
His Arg Asp Pro Tyr Ala Thr Ala Phe Leu Val Thr Glu Ser Val Ser	
1610 1615 1620 1625	
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Ile Thr Cys Arg His Gln Leu Leu Thr His Leu His Arg Gln Leu Ser	
1630 1635 1640	
aag gcc cag aag cac cga gga tca ctt gaa ata gca gac cag ctg cag	5115
Lys Ala Gln Lys His Arg Gly Ser Leu Glu Ile Ala Asp Gln Leu Gln	
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Gly Leu Ser Leu Gln Glu Met Pro Gly Asp Val Pro Leu Ala Arg Ile	
1660 1665 1670	
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Gln Arg Leu Phe Ser Phe Arg Ala Leu Glu Ser Gly His Phe Pro Gln	
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1690 1695 1700 1705	
gtg act gtg tgt gtg ttg gcc ctg gcc acc ctc cag ccc gga acc gtg	5307
Val Thr Val Cys Val Leu Ala Leu Ala Thr Leu Gln Pro Gly Thr Val	
1710 1715 1720	
ggc aac acc ctc ctg ctg acc cgg ctg gaa aag gac agt ccc cca gtc	5355
Gly Asn Thr Leu Leu Leu Thr Arg Leu Glu Lys Asp Ser Pro Pro Val	
1725 1730 1735	
agt gtg cag att ccc act ggc cag aac aag ctt cat ctg cgt tca gtc	5403
Ser Val Gln Ile Pro Thr Gly Gln Asn Lys Leu His Leu Arg Ser Val	
1740 1745 1750	
ctg aat gag ttt gat gcc atc cag aag gca cag aaa gag aac agc agc	5451
Leu Asn Glu Phe Asp Ala Ile Gln Lys Ala Gln Lys Glu Asn Ser Ser	
1755 1760 1765	
tgt act gac aag cga gaa tgg tgg aca ggg cgg ctg gca ctg gac cac	5499
Cys Thr Asp Lys Arg Glu Trp Trp Thr Gly Arg Leu Ala Leu Asp His	
1770 1775 1780 1785	
agg atg gag gtt ctc atc gct tcc cta gag aag tct gtg ctg ggc tgc	5547
Arg Met Glu Val Leu Ile Ala Ser Leu Glu Lys Ser Val Leu Gly Cys	
1790 1795 1800	

tgg aag ggg ctg ctg ctg ccg tcc agt gag gag ccc ggc cct gcc cag	5595
Trp Lys Gly Leu Leu Leu Pro Ser Ser Glu Glu Pro Gly Pro Ala Gln	
1805 1810 1815	
gag gcc tcc cgc cta cag gag ctg cta cag gac tgt ggc tgg aaa tat	5643
Glu Ala Ser Arg Leu Gln Glu Leu Leu Gln Asp Cys Gly Trp Lys Tyr	
1820 1825 1830	
cct gac cgc act ctg ctg aaa atc atg ctc agt ggt gcc ggt gcc ctc	5691
Pro Asp Arg Thr Leu Leu Lys Ile Met Leu Ser Gly Ala Gly Ala Leu	
1835 1840 1845	
acc cct cag gac att cag gcc ctg gcc tac ggg ctg tgc cca acc cag	5739
Thr Pro Gln Asp Ile Gln Ala Leu Ala Tyr Gly Leu Cys Pro Thr Gln	
1850 1855 1860 1865	
cca gag cga cag gag ctc ctg aat gag gca gta gga cgt cta cag	5787
Pro Glu Arg Ala Gln Glu Leu Leu Asn Glu Ala Val Gly Arg Leu Gln	
1870 1875 1880	
ggc ctg aca gta cca agc aat agc cac ctt gtc ttg gtc cta gac aag	5835
Gly Leu Thr Val Pro Ser Asn Ser His Leu Val Leu Val Leu Asp Lys	
1885 1890 1895	
gac ttg cag aag ctg ccg tgg gaa agc atg ccc agc ctc caa gca ctg	5883
Asp Leu Gln Lys Leu Pro Trp Glu Ser Met Pro Ser Leu Gln Ala Leu	
1900 1905 1910	
cct gtc acc cgg ctg ccc tcc ttc cgc ttc cta ctc agc tac tcc atc	5931
Pro Val Thr Arg Leu Pro Ser Phe Arg Phe Leu Leu Ser Tyr Ser Ile	
1915 1920 1925	
atc aaa gag tat ggg gcc tcg cca gtg ctg agt caa ggg gtg gat cca	5979
Ile Lys Glu Tyr Gly Ala Ser Pro Val Leu Ser Gln Gly Val Asp Pro	
1930 1935 1940 1945	
cga agt acc ttc tat gtc ctg aac cct cac aat aac ctg tca agc aca	6027
Arg Ser Thr Phe Tyr Val Leu Asn Pro His Asn Asn Leu Ser Ser Thr	
1950 1955 1960	
gag gag caa ttt cga gcc aat ttc agc agt gaa gct ggc tgg aga gga	6075
Glu Glu Gln Phe Arg Ala Asn Phe Ser Ser Glu Ala Gly Trp Arg Gly	
1965 1970 1975	
gtg gtt ggg gag gtg cca aga cct gaa cag gtg cag gaa gcc ctg aca	6123
Val Val Gly Glu Val Pro Arg Pro Glu Gln Val Gln Glu Ala Leu Thr	
1980 1985 1990	
aag cat gat ttg tat atc tat gca ggg cat ggg gct ggt gcc cgc ttc	6171
Lys His Asp Leu Tyr Ile Tyr Ala Gly His Gly Ala Gly Ala Arg Phe	
1995 2000 2005	
ctt gat ggg cag gct gtc ctg cgg ctg agc tgt cgg gca gtg gcc ctg	6219
Leu Asp Gly Gln Ala Val Leu Arg Leu Ser Cys Arg Ala Val Ala Leu	
2010 2015 2020 2025	
ctg ttt ggc tgt agc agt gcg gcc ctg gct gtg cat gga aac ctg gag	6267
Leu Phe Gly Cys Ser Ser Ala Ala Leu Ala Val His Gly Asn Leu Glu	
2030 2035 2040	
ggg gct ggc atc gtg ctc aag tac atc atg gct ggt tgc ccc ttg ttt	6315
Gly Ala Gly Ile Val Leu Lys Tyr Ile Met Ala Gly Cys Pro Leu Phe	

2045	2050	2055	
ctg ggt aat ctc tgg gat gtg act gac cgc gac att gac cgc tac acg Leu Gly Asn Leu Trp Asp Val Thr Asp Arg Asp Ile Asp Arg Tyr Thr			6363
2060	2065	2070	
gaa gct ctg ctg caa ggc tgg ctt gga gca ggc cca ggg gcc ccc ctt Glu Ala Leu Leu Gln Gly Trp Leu Gly Ala Gly Pro Gly Ala Pro Leu			6411
2075	2080	2085	
ctc tac tat gta aac cag gcc cgc caa gct ccc cga ctc aag tat ctt Leu Tyr Tyr Val Asn Gln Ala Arg Gln Ala Pro Arg Leu Lys Tyr Leu			6459
2090	2095	2100	2105
att ggg gct gca cct ata gcc tat ggc ttg cct gtc tct ctg cgg taa Ile Gly Ala Ala Pro Ile Ala Tyr Gly Leu Pro Val Ser Leu Arg			6507
2110	2115		2120
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tcctttgat ttaacctcag tataataaaag atacatcatt t			6668
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Lys Glu Ala Glu Glu Leu Leu Pro Asp Leu Lys Glu Phe Leu Ser Asn 20 25 30			
Pro Pro Ala Gly Phe Pro Ser Ser Arg Ser Asp Ala Glu Arg Arg Gln 35 40 45			
Ala Cys Asp Ala Ile Leu Arg Ala Cys Asn Gln Gln Leu Thr Ala Lys 50 55 60			
Leu Ala Cys Pro Arg His Leu Gly Ser Leu Leu Glu Leu Ala Glu Leu 65 70 75 80			
Ala Cys Asp Gly Tyr Leu Val Ser Thr Pro Gln Arg Pro Pro Leu Tyr 85 90 95			
Leu Glu Arg Ile Leu Phe Val Leu Leu Arg Asn Ala Ala Gln Gly 100 105 110			
Ser Pro Glu Val Thr Leu Arg Leu Ala Gln Pro Leu His Ala Cys Leu 115 120 125			
Val Gln Cys Ser Arg Glu Ala Ala Pro Gln Asp Tyr Glu Ala Val Ala 130 135 140			
Arg Gly Ser Phe Ser Leu Leu Trp Lys Gly Ala Glu Ala Leu Leu Glu 145 150 155 160			
Arg Arg Ala Ala Phe Ala Ala Arg Leu Lys Ala Leu Ser Phe Leu Val			

165

170

175

Leu Leu Glu Asp Glu Ser Thr Pro Cys Glu Val Pro His Phe Ala Ser
 180 185 190

Pro Thr Ala Cys Arg Ala Val Ala Ala His Gln Leu Phe Asp Ala Ser
 195 200 205

Gly His Gly Leu Asn Glu Ala Asp Ala Asp Phe Leu Asp Asp Leu Leu
 210 215 220

Ser Arg His Val Ile Arg Ala Leu Val Gly Glu Arg Gly Ser Ser Ser
 225 230 235 240

Gly Leu Leu Ser Pro Gln Arg Ala Leu Cys Leu Leu Glu Leu Thr Leu
 245 250 255

Glu His Cys Arg Arg Phe Cys Trp Ser Arg His His Asp Lys Ala Ile
 260 265 270

Ser Ala Val Glu Lys Ala His Ser Tyr Leu Arg Asn Thr Asn Leu Ala
 275 280 285

Pro Ser Leu Gln Leu Cys Gln Leu Gly Val Lys Leu Leu Gln Val Gly
 290 295 300

Glu Glu Gly Pro Gln Ala Val Ala Lys Leu Leu Ile Lys Ala Ser Ala
 305 310 315 320

Val Leu Ser Lys Ser Met Glu Ala Pro Ser Pro Pro Leu Arg Ala Leu
 325 330 335

Tyr Glu Ser Cys Gln Phe Phe Leu Ser Gly Leu Glu Arg Gly Thr Lys
 340 345 350

Arg Arg Tyr Arg Leu Asp Ala Ile Leu Ser Leu Phe Ala Phe Leu Gly
 355 360 365

Gly Tyr Cys Ser Leu Leu Gln Gln Leu Arg Asp Asp Gly Val Tyr Gly
 370 375 380

Gly Ser Ser Lys Gln Gln Gln Ser Phe Leu Gln Met Tyr Phe Gln Gly
 385 390 395 400

Leu His Leu Tyr Thr Val Val Val Tyr Asp Phe Ala Gln Gly Cys Gln
 405 410 415

Ile Val Asp Leu Ala Asp Leu Thr Gln Leu Val Asp Ser Cys Lys Ser
 420 425 430

Thr Val Val Trp Met Leu Glu Ala Leu Glu Gly Leu Ser Gly Gln Glu
 435 440 445

Leu Thr Asp His Met Gly Met Thr Ala Ser Tyr Thr Ser Asn Leu Ala
 450 455 460

Tyr Ser Phe Tyr Ser His Lys Leu Tyr Ala Glu Ala Cys Ala Ile Ser
 465 470 475 480

Glu Pro Leu Cys Gln His Leu Gly Leu Val Lys Pro Gly Thr Tyr Pro
 485 490 495

Glu Val Pro Pro Glu Lys Leu His Arg Cys Phe Arg Leu Gln Val Glu
 500 505 510

Ser Leu Lys Lys Leu Gly Lys Gln Ala Gln Gly Cys Lys Met Val Ile
 515 520 525

Leu Trp Leu Ala Ala Leu Gln Pro Cys Ser Pro Glu His Met Ala Glu
 530 535 540

Pro Val Thr Phe Trp Val Arg Val Lys Met Asp Ala Ala Arg Ala Gly
 545 550 555 560

Asp Lys Glu Leu Gln Leu Lys Thr Leu Arg Asp Ser Leu Ser Gly Trp
 565 570 575

Asp Pro Glu Thr Leu Ala Leu Leu Leu Arg Glu Glu Leu Gln Ala Tyr
 580 585 590

Lys Ala Val Arg Ala Asp Thr Gly Gln Glu Arg Phe Asn Ile Ile Cys
 595 600 605

Asp Leu Leu Glu Leu Ser Pro Glu Glu Thr Pro Ala Gly Ala Trp Ala
 610 615 620

Arg Ala Thr His Leu Val Glu Leu Ala Gln Val Leu Cys Tyr His Asp
 625 630 635 640

Phe Thr Gln Gln Thr Asn Cys Ser Ala Leu Asp Ala Ile Arg Glu Ala
 645 650 655

Leu Gln Leu Leu Asp Ser Val Arg Pro Glu Ala Gln Ala Arg Asp Gln
 660 665 670

Leu Leu Asp Asp Lys Ala Gln Ala Leu Leu Trp Leu Tyr Ile Cys Thr
 675 680 685

Leu Glu Ala Lys Ile Gln Glu Gly Ile Glu Arg Asp Arg Arg Ala Gln
 690 695 700

Ala Pro Gly Asn Leu Glu Glu Phe Glu Val Asn Asp Leu Asn Tyr Glu
 705 710 715 720

Asp Lys Leu Gln Glu Asp Arg Phe Leu Tyr Ser Asn Ile Ala Phe Asn
 725 730 735

Leu Ala Ala Asp Ala Ala Gln Ser Lys Cys Leu Asp Gln Ala Leu Ala
 740 745 750

Leu Trp Lys Glu Leu Leu Thr Lys Gly Gln Ala Pro Ala Val Arg Cys
 755 760 765

Leu Gln Gln Thr Ala Ala Ser Leu Gln Ile Leu Ala Ala Leu Tyr Gln
 770 775 780

Leu Val Ala Lys Pro Met Gln Ala Leu Glu Val Leu Leu Leu Leu Arg
 785 790 795 800

Ile Val Ser Glu Arg Leu Lys Asp His Ser Lys Ala Ala Gly Ser Ser
 805 810 815

Cys His Ile Thr Gln Leu Leu Leu Thr Leu Gly Cys Pro Ser Tyr Ala
 820 825 830

Gln Leu His Leu Glu Glu Ala Ala Ser Ser Leu Lys His Leu Asp Gln
 835 840 845

Thr Thr Asp Thr Tyr Leu Leu Leu Ser Leu Thr Cys Asp Leu Leu Arg
 850 855 860

Ser Gln Leu Tyr Trp Thr His Gln Lys Val Thr Lys Gly Val Ser Leu
 865 870 875 880

Leu Leu Ser Val Leu Arg Asp Pro Ala Leu Gln Lys Ser Ser Lys Ala
 885 890 895

Trp Tyr Leu Leu Arg Val Gln Val Leu Gln Leu Val Ala Ala Tyr Leu
 900 905 910

Ser Leu Pro Ser Asn Asn Leu Ser His Ser Leu Trp Glu Gln Leu Cys
 915 920 925

Ala Gln Gly Trp Gln Thr Pro Glu Ile Ala Leu Ile Asp Ser His Lys
 930 935 940

Leu Leu Arg Ser Ile Ile Leu Leu Leu Met Gly Ser Asp Ile Leu Ser
 945 950 955 960

Thr Gln Lys Ala Ala Val Glu Thr Ser Phe Leu Asp Tyr Gly Glu Asn
 965 970 975

Leu Val Gln Lys Trp Gln Val Leu Ser Glu Val Leu Ser Cys Ser Glu
 980 985 990

Lys Leu Val Cys His Leu Gly Arg Leu Gly Ser Val Ser Glu Ala Lys
 995 1000 1005

Ala Phe Cys Leu Glu Ala Leu Lys Leu Thr Thr Lys Leu Gln Ile Pro
 1010 1015 1020

Arg Gln Cys Ala Leu Phe Leu Val Leu Lys Gly Glu Leu Glu Leu Ala
 1025 1030 1035 1040

Arg Asn Asp Ile Asp Leu Cys Gln Ser Asp Leu Gln Gln Val Leu Phe
 1045 1050 1055

Leu Leu Glu Ser Cys Thr Glu Phe Gly Gly Val Thr Gln His Leu Asp
 1060 1065 1070

Ser Val Lys Lys Val His Leu Gln Lys Gly Lys Gln Gln Ala Gln Val
 1075 1080 1085

Pro Cys Pro Pro Gln Leu Pro Glu Glu Glu Leu Phe Leu Arg Gly Pro
 1090 1095 1100

Ala Leu Glu Leu Val Ala Thr Val Ala Lys Glu Pro Gly Pro Ile Ala
 1105 1110 1115 1120

Pro Ser Thr Asn Ser Ser Pro Val Leu Lys Thr Lys Pro Gln Pro Ile
 1125 1130 1135

Pro Asn Phe Leu Ser His Ser Pro Thr Cys Asp Cys Ser Leu Cys Ala
 1140 1145 1150

Ser Pro Val Leu Thr Ala Val Cys Leu Arg Trp Val Leu Val Thr Ala

1155	1160	1165	
Gly Val Arg Leu Ala Met Gly His Gln Ala Gln	Gly Leu Asp Leu Leu		
1170	1175	1180	
Gln Val Val Leu Lys Gly Cys Pro Glu Ala Ala	Glu Arg Leu Thr Gln		
1185	1190	1195	1200
Ala Leu Gln Ala Ser Leu Asn His Lys Thr Pro	Pro Ser Leu Val Pro		
1205	1210	1215	
Ser Leu Leu Asp Glu Ile Leu Ala Gln Ala	Tyr Thr Leu Leu Ala Leu		
1220	1225	1230	
Glu Gly Leu Asn Gln Pro Ser Asn Glu Ser Leu	Gln Lys Val Leu Gln		
1235	1240	1245	
Ser Gly Leu Lys Phe Val Ala Ala Arg Ile Pro	His Leu Glu Pro Trp		
1250	1255	1260	
Arg Ala Ser Leu Leu Leu Ile Trp Ala Leu Thr	Lys Leu Gly Gly Leu		
1265	1270	1275	1280
Ser Cys Cys Thr Thr Gln Leu Phe Ala Ser	Ser Trp Gly Trp Gln Pro		
1285	1290	1295	
Pro Leu Ile Lys Ser Val Pro Gly Ser Glu Pro	Ser Lys Thr Gln Gly		
1300	1305	1310	
Gln Lys Arg Ser Gly Arg Gly Arg Gln Lys	Leu Ala Ser Ala Pro Leu		
1315	1320	1325	
Ser Leu Asn Asn Thr Ser Gln Lys Gly Leu	Glu Gly Arg Gly Leu Pro		
1330	1335	1340	
Cys Thr Pro Lys Pro Pro Asp Arg Ile Arg	Gln Ala Gly Pro His Val		
1345	1350	1355	1360
Pro Phe Thr Val Phe Glu Glu Val Cys Pro	Thr Glu Ser Lys Pro Glu		
1365	1370	1375	
Val Pro Gln Ala Pro Arg Val Gln Gln Arg	Val Gln Thr Arg Leu Lys		
1380	1385	1390	
Val Asn Phe Ser Asp Asp Ser Asp Leu Glu Asp	Pro Val Ser Ala Glu		
1395	1400	1405	
Ala Trp Leu Ala Glu Glu Pro Lys Arg Arg	Gly Thr Ala Ser Arg Gly		
1410	1415	1420	
Arg Gly Arg Ala Arg Lys Gly Leu Ser Leu	Lys Thr Asp Ala Val Val		
1425	1430	1435	1440
Ala Pro Gly Ser Ala Pro Gly Asn Pro Gly	Leu Asn Gly Arg Ser Arg		
1445	1450	1455	
Arg Ala Lys Lys Val Ala Ser Arg His Cys	Glu Glu Arg Arg Pro Gln		
1460	1465	1470	
Arg Ala Ser Asp Gln Ala Arg Pro Gly Pro	Glu Ile Met Arg Thr Ile		
1475	1480	1485	
Pro Glu Glu Glu Leu Thr Asp Asn Trp Arg	Lys Met Ser Phe Glu Ile		

1490

1495

1500

Leu Arg Gly Ser Asp Gly Glu Asp Ser Ala Ser Gly Gly Lys Thr Pro
 1505 1510 1515 1520

Ala Pro Gly Pro Glu Ala Ala Ser Gly Glu Trp Glu Leu Leu Arg Leu
 1525 1530 1535

Asp Ser Ser Lys Lys Lys Leu Pro Ser Pro Cys Pro Asp Lys Glu Ser
 1540 1545 1550

Asp Lys Asp Leu Gly Pro Arg Leu Gln Leu Pro Ser Ala Pro Val Ala
 1555 1560 1565

Thr Gly Leu Ser Thr Leu Asp Ser Ile Cys Asp Ser Leu Ser Val Ala
 1570 1575 1580

Phe Arg Gly Ile Ser His Cys Pro Pro Ser Gly Leu Tyr Ala His Leu
 1585 1590 1595 1600

Cys Arg Phe Leu Ala Leu Cys Leu Gly His Arg Asp Pro Tyr Ala Thr
 1605 1610 1615

Ala Phe Leu Val Thr Glu Ser Val Ser Ile Thr Cys Arg His Gln Leu
 1620 1625 1630

Leu Thr His Leu His Arg Gln Leu Ser Lys Ala Gln Lys His Arg Gly
 1635 1640 1645

Ser Leu Glu Ile Ala Asp Gln Leu Gln Gly Leu Ser Leu Gln Glu Met
 1650 1655 1660

Pro Gly Asp Val Pro Leu Ala Arg Ile Gln Arg Leu Phe Ser Phe Arg
 1665 1670 1675 1680

Ala Leu Glu Ser Gly His Phe Pro Gln Pro Glu Lys Glu Ser Phe Gln
 1685 1690 1695

Glu Arg Leu Ala Leu Ile Pro Ser Gly Val Thr Val Cys Val Leu Ala
 1700 1705 1710

Leu Ala Thr Leu Gln Pro Gly Thr Val Gly Asn Thr Leu Leu Leu Thr
 1715 1720 1725

Arg Leu Glu Lys Asp Ser Pro Pro Val Ser Val Gln Ile Pro Thr Gly
 1730 1735 1740

Gln Asn Lys Leu His Leu Arg Ser Val Leu Asn Glu Phe Asp Ala Ile
 1745 1750 1755 1760

Gln Lys Ala Gln Lys Glu Asn Ser Ser Cys Thr Asp Lys Arg Glu Trp
 1765 1770 1775

Trp Thr Gly Arg Leu Ala Leu Asp His Arg Met Glu Val Leu Ile Ala
 1780 1785 1790

Ser Leu Glu Lys Ser Val Leu Gly Cys Trp Lys Gly Leu Leu Leu Pro
 1795 1800 1805

Ser Ser Glu Glu Pro Gly Pro Ala Gln Glu Ala Ser Arg Leu Gln Glu
 1810 1815 1820

Leu Leu Gln Asp Cys Gly Trp Lys Tyr Pro Asp Arg Thr Leu Leu Lys
 1825 1830 1835 1840

Ile Met Leu Ser Gly Ala Gly Ala Leu Thr Pro Gln Asp Ile Gln Ala
 1845 1850 1855

Leu Ala Tyr Gly Leu Cys Pro Thr Gln Pro Glu Arg Ala Gln Glu Leu
 1860 1865 1870

Leu Asn Glu Ala Val Gly Arg Leu Gln Gly Leu Thr Val Pro Ser Asn
 1875 1880 1885

Ser His Leu Val Leu Val Leu Asp Lys Asp Leu Gln Lys Leu Pro Trp
 1890 1895 1900

Glu Ser Met Pro Ser Leu Gln Ala Leu Pro Val Thr Arg Leu Pro Ser
 1905 1910 1915 1920

Phe Arg Phe Leu Leu Ser Tyr Ser Ile Ile Lys Glu Tyr Gly Ala Ser
 1925 1930 1935

Pro Val Leu Ser Gln Gly Val Asp Pro Arg Ser Thr Phe Tyr Val Leu
 1940 1945 1950

Asn Pro His Asn Asn Leu Ser Ser Thr Glu Glu Gln Phe Arg Ala Asn
 1955 1960 1965

Phe Ser Ser Glu Ala Gly Trp Arg Gly Val Val Gly Glu Val Pro Arg
 1970 1975 1980

Pro Glu Gln Val Gln Glu Ala Leu Thr Lys His Asp Leu Tyr Ile Tyr
 1985 1990 1995 2000

Ala Gly His Gly Ala Gly Ala Arg Phe Leu Asp Gly Gln Ala Val Leu
 2005 2010 2015

Arg Leu Ser Cys Arg Ala Val Ala Leu Leu Phe Gly Cys Ser Ser Ala
 2020 2025 2030

Ala Leu Ala Val His Gly Asn Leu Glu Gly Ala Gly Ile Val Leu Lys
 2035 2040 2045

Tyr Ile Met Ala Gly Cys Pro Leu Phe Leu Gly Asn Leu Trp Asp Val
 2050 2055 2060

Thr Asp Arg Asp Ile Asp Arg Tyr Thr Glu Ala Leu Leu Gln Gly Trp
 2065 2070 2075 2080

Leu Gly Ala Gly Pro Gly Ala Pro Leu Leu Tyr Tyr Val Asn Gln Ala
 2085 2090 2095

Arg Gln Ala Pro Arg Leu Lys Tyr Leu Ile Gly Ala Ala Pro Ile Ala
 2100 2105 2110

Tyr Gly Leu Pro Val Ser Leu Arg
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1 5